

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. - 28. (Cancelled)

29. (Currently Amended) A base station apparatus comprising:

a deciding section for deciding an allocation for a plurality of mobile stations within a communication area, by judging:

1) whether one of the plurality of mobile stations is a space-division-multiplex (SDM) compatible mobile station by use of a predetermined SDM evaluation criterion; and

2) whether another of the plurality of mobile stations is a space-division-multiple-access (SDMA) compatible mobile station to which a SDMA transmission can be applied along with the SDM compatible mobile station by use of a predetermined SDMA evaluation criterion;

a partial-space orthogonalizing means-section for making-performing a weighting process, for enhancing orthogonality over a propagation path for a space-division-multiplexthe SDM transmission, on a first transmission data sequence to be sent by the space-division multiplexSDM transmission to a-the space-division-multiplexSDM compatible mobile station allocated for the space-division-multiplex transmission within a communication area;

a beam forming section for forming a plurality of transmission beams to a space-division-multiple-access compatible mobile station responsive to a transmission data sequence within the communication area and-for an output of the partial-space orthogonalizing means,section in order to send the first transmission data sequence by the SDM transmission to the SDM compatible mobile station the transmission beam to the space-division-multiple-access compatible mobile station being to reduce an interference with another space-division-multiple-access compatible mobile station to access simultaneouslyand a single transmission beam for a

second transmission data sequence to be sent by the SDMA transmission to the SDMA compatible mobile station; and

a plurality of antennas for transmitting the first transmission data sequence using the plurality of transmission beams and the second transmission data sequence using the single transmission beam_{7,1}

~~— a deciding section for allocating the space division multiple access compatible mobile station and the space division multiplex compatible mobile station by use of a predetermined space division multiplex transmission evaluation criterion and space division multiple access evaluation criterion.~~

30. (Currently Amended) A base station apparatus according to claim 29, wherein forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam from the transmission data sequence to the allocated ~~space-division-multiple-access~~ SDMA compatible mobile station and the ~~an~~ output of the partial-space orthogonizing means, in a manner being orthogonal to a channel estimation matrix on another mobile station to access simultaneously.

31. (Currently Amended) A base station apparatus according to claim 29, wherein, in a case that the ~~space-division-multiplex~~ SDM compatible mobile station and a ~~space-division-multiplex~~ SDM incompatible mobile station are allocated for the ~~space-division-multiple access~~ SDMA communication at a same time, the beam forming section makes, for the ~~space-division-multiplex~~ SDM incompatible mobile station, a maximum ratio synthetic beam as a transmission beam to the ~~space-division-multiplex~~ SDM incompatible mobile station and, for the ~~space-division-multiplex~~ SDM compatible mobile station, another transmission beam as a beam for reducing an interference with another of the ~~space-division-multiplex~~ SDM incompatible mobile station and ~~space-division-multiplex~~ the SDM compatible mobile station to access simultaneously.

32. (Currently Amended) A base station apparatus according to claim 30, wherein, in a case that the ~~space-division-multiplex~~ SDM compatible mobile station and a ~~space-division-multiplex~~ SDM incompatible mobile station are allocated for the ~~space-division-multiple access~~ SDMA communication at a same time, the beam forming section makes, for the ~~space-division-multiplex~~ SDM incompatible mobile station, a maximum ratio synthetic beam as a

transmission beam to the ~~space-division-multiplex~~SDM incompatible mobile station and, for the ~~space-division-multiplex~~SDM compatible mobile station, another transmission beam as a beam for reducing an interference with another of the ~~space-division-multiplex~~SDM incompatible mobile station and ~~space-division-multiplex~~the SDM compatible mobile station to access simultaneously.

33. (Currently Amended) A base station apparatus according to claim 29, wherein, forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam orthogonal to a channel estimation matrix on another of a ~~space-division-multiplex~~SDM incompatible mobile station and ~~space-division-multiplex~~the SDM compatible mobile station to access simultaneously.

34. (Currently Amended) A base station apparatus according to claim 29, further comprising space-time coding means for making a space-time coding process on the transmission data sequence to the ~~space-division-multiplex~~SDM compatible mobile station,

the transmission data sequence space-time-coded being outputted to the partial-space orthogonizing means.

35. (Currently Amended) A base station apparatus according to claim 30, further comprising space-time coding means for making a space-time coding process on the transmission data sequence to the ~~space-division-multiplex~~SDM compatible mobile station,

the transmission data sequence space-time-coded being outputted to the partial-space orthogonizing means.

36. - 38. (Cancelled)

39. (Currently Amended) A base station apparatus according to claim 29, wherein the ~~space-division-multiplex~~SDM transmission evaluation criterion and the ~~space-division-multiple-access~~SDMA evaluation criterion are to be calculated depending upon a channel estimation value and received quality received from the ~~space-division-multiplex~~SDM compatible mobile station and the ~~space-division-multiple-access~~SDMA mobile station within the communication area.

40. (Currently Amended) A base station apparatus according to claim 30, wherein the ~~space-division-multiplexSDM~~ transmission evaluation criterion and the ~~space-division-multiple-accessSDMA~~ evaluation criterion are to be calculated depending upon a channel estimation value and received quality received from the ~~space-division-multiplexSDM~~ compatible mobile station and the ~~space-division-multiple-accessSDMA~~ mobile station within the communication area.

41. (Currently Amended) A base station apparatus according to claim 33, wherein the ~~space-division-multiplexSDM~~ transmission evaluation criterion and the ~~space-division-multiple-accessSDMA~~ evaluation criterion are to be calculated depending upon a channel estimation value and received quality received from the ~~space-division-multiplexSDM~~ compatible mobile station and the ~~space-division-multiple-accessSDMA~~ mobile station within the communication area.

42. (Currently Amended) A base station apparatus according to claim 29, wherein, in a case that the ~~space-division-multiple-accessSDMA~~ mobile stations include a ~~space-division-multiplexSDM~~ compatible mobile station and a ~~space-division-multiplexSDM~~ incompatible mobile station, another transmission beam to the ~~space-division-multiplexSDM~~ incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the ~~space-division-multiplexSDM~~ incompatible mobile station, and the transmission beam to the ~~space-division-multiplexSDM~~ compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another ~~space-division-multiple-accessSDMA~~ mobile stations to access simultaneously.

43. (Currently Amended) A base station apparatus according to claim 30, wherein, in a case that the ~~space-division-multiple-accessSDMA~~ mobile stations include a ~~space-division-multiplexSDM~~ compatible mobile station and a ~~space-division-multiplexSDM~~ incompatible mobile station, another transmission beam to the ~~space-division-multiplexSDM~~ incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the ~~space-division-multiplexSDM~~ incompatible mobile station, and the transmission beam to the ~~space-division-multiplexSDM~~ compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another ~~space-division-multiple-accessSDMA~~ mobile stations to access simultaneously.